Paper ID: 71001
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IAF/IAA SPACE LIFE SCIENCES SYMPOSIUM (A1)
Radiation Fields, Effects and Risks in Human Space Missions (5)

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MARTIAN INFRASTRUCTURE RADIATION PROTECTION USING SILICA AEROGEL

Abstract

The space race is at its peak, and Mars is the next target for humanity. However, the environmental conditions on Mars do not support the idea, and some methods of creating a habitable environment include dropping nuclear weaponry on the poles and others that are not very promising and can turn out to be disastrous failures. This study fills a need in our understanding of how to accept the current atmospheric conditions and establish a base. In this study, we examined the Martian surface and atmosphere and discovered that certain coordinates, notably in the poles, are made up of carbon dioxide and ice, giving rise to the solid-state greenhouse effect. Further examination reveals that damaging UV radiations also reach the surface due to the thin atmosphere, which poses a threat to human existence, we have analyzed aerogels with low thermal conductivity for reproducing solid-state greenhouses for increasing the temperature of bases to habitable conditions and aerogel which is an insulator to UV radiations but does permeate light, and we discovered that silica aerogel aligns perfectly with our goals, which are 97% air by volume and with thermal conductivity 0.013 W-1 K-1, 2-4 cm of thickness silica aerogel can significantly increase the temperature of the region covered in aerogel to a temperature considered habitable for life 45K The silicon aerogel is a strong UV radiation insulator (200-300nm) and would prevent UV radiations from entering the body The silicon aerogel is a powerful UV radiation insulator (200-300nm) and would prevent UV radiations from entering the base. Our methods contribute to the literature on how humans can create a base on Mars without affecting the planet's atmospheric conditions. Further advancements in research and contributions would eventually lead to a greater understanding of the martian surface and atmosphere, increasing our prospects of making progress toward constructing a martian base and achieving the objective of becoming a multi-planetary species.